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RELATION OF BIOGRAPHICAL FACTORS TO SUCCESSFUL COMPLETION OF AI--ETC(U)
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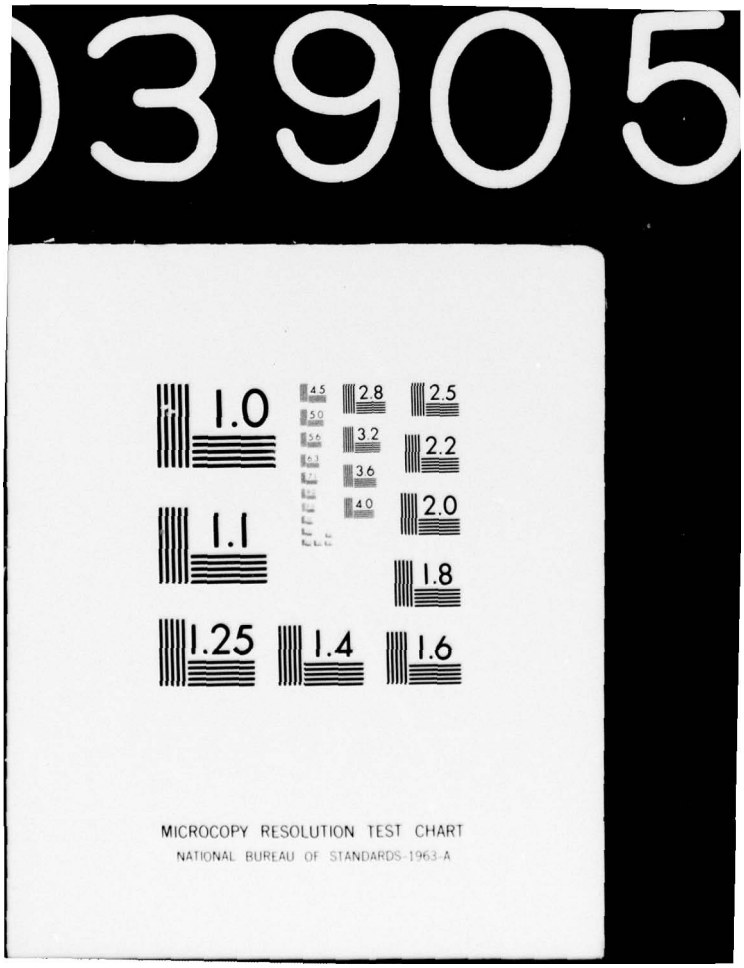
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(6) RELATION OF BIOGRAPHICAL FACTORS TO SUCCESSFUL COMPLETION OF AIR FORCE TOUR

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Relation of Biographical Factors to Successful Completion of Air Force Tour

The purpose of this study was to validate the Airman Biographical Inventory against successful completion of the first tour of duty in the Air Force. The main criterion (B) is a dichotomy in which the upper or successful group consists of men who reenlisted or were normally discharged, i.e., they were eligible to reenlist but did not. The lower or unsuccessful group consists of men discharged for unsuitability or non-advancement before completion of tour, or men who served the full time but were not eligible for reenlistment because of non-advancement. Men discharged for certain special reasons such as medical or to enter officer training were not included in either criterion group.

(cont on p. 5)

Criterion A differs from criterion B in that the upper group consists of reenlistees and normal dischargees who attained the grade of A/1C or higher; all other reenlistees and dischargees are included with the unsuitables and non-advancers to form the lower group. The determination of this criterion is not altogether accurate due to the fact that the records show grade only at time of reenlistment or discharge. Hence a good many early reenlistees may be recorded with a lower grade than they actually held at the end of their tour.

SAMPLE

The study is based on airmen who entered with no prior service during the first six months of 1956. These men were examined on the Airman Classification Battery AC-2A which was introduced at the beginning of 1956. Only 25,715 cases could be matched on Biographical Inventory records and reenlistment-discharge records, although it is estimated that nearly twice that number entered during this period.

BIOGRAPHICAL INVENTORY

The Biographical Inventory, Booklet One of the Airman Classification Battery AC-2A, contains items from two earlier sources. One source was the original form (BE601B) which was part of the first Airman Classification Battery. The items in this form were used by DuBois and others (DuBois, 1952) to develop a set of nine homogeneous keys. The second source of items for the present battery was an inventory (BE-CE601DX2) constructed by Berkeley who developed another set of 13 homogeneous keys based on these items. Neither set of homogeneous keys has been used operationally, although the keyed items are in the present inventory.

The three operational keys, Mechanical, Electronic, and Administrative, were based on items in the original inventory. These keys were intended to be differentially valid for the three career fields in predicting academic success in technical training courses.

PROCEDURE

The 25,715 cases were distributed by the first two digits of the AFSC in preparation for the selection of AFSC groups with enough cases for item analysis. This distribution with breakdowns by upper and lower categories on criteria A and B are shown in Table 1. The 14 AFSCs selected for item analysis are shown below.

27 Air Traffic Control & Warning
29 Communications Operations
30 Radio-Radar Systems
32 Armament Systems Maintenance & Gunner
42 Aircraft & Missile Accessory Maintenance
43 Aircraft & Missile Maintenance
46 Munitions & Weapons Maintenance
47 Motor Vehicle Maintenance
56 Utilities
60 Transportation
62 Food Service
64 Supply
70 Administrative
77 Air Police

For criterion B an analysis of the difficulty and discrimination of each item was done for each of the 14 AFSCs using 200 cases for the upper category and 200 for the lower. The upper and lower criterion groups were selected randomly from the total number available in each AFSC. A similar analysis was done for eight of these AFSCs using criterion A: 27, 29, 30, 32, 42, 43, 64, 70.

On the basis of these item analyses three new keys were devised. The General Key consists of items which are generally valid across all AFSC samples. In selecting items for the Special Mechanical and Special Clerical keys an attempt was made to select items which were valid for the appropriate AFSCs but not for others.

The new keys were cross validated on a random sample of 200 upper and 200 lower cases of the unused remainder in the AFSC. If not more than 400 cases were left in the AFSC, the entire remainder was used. Only 10 of the 14 samples contained enough cases for cross validation on criterion B,

and only three of the eight for criterion A. An additional cross validation sample of 500 cases was randomly selected to represent the total sample, (Jan-Jun 1956), including AFSCs for which no item analyses were done.

The cross validation samples were used to determine the validity not only for the three new keys devised in this study but for the older keys developed by DuBois and Berkeley, and for the three AC-2A operational keys.

Validity is expressed in terms of a biserial correlation in which the means and standard deviations are based on upper 200 and lower 200 cases, but the p, q, and y values represent the actual dichotomy in each AFSC total.

Significance was determined by finding the significance of the difference between the mean of the upper group and the mean of the lower group and relating this value to the associated biserial correlation. This procedure shows that a biserial of .12 or above is significant at least at the .05 level, while a biserial of .17 or above is significant at least at the .01 level.

RESULTS

By far the most valid item in the original samples was that relating to amount of education. Validities for high school vs. non-high school against criterion B ranged from .26 to .45 with a median of .36. (These validities are phi coefficients with a 50-50 split of the criterion.) Other items selected for the General Key were heterogeneous in nature and most also occurred in various homogeneous keys. After the education item, the next best items were age, ability to operate a typewriter, and attendance at a small rather than large high school.

Whereas many of the items selected for the Special Clerical key involve preference for or experience in office work, none of the items selected for the Special Mechanical Key involve preference for or experience in mechanical work unless scored negatively.

Table 2 presents the biserial validities for all the new and old keys using criterion B, separately for each AFSC and the random cross validation samples. The new General Key is quite successful in predicting the criterion with validities ranging from .30 to .47. The Special Mechanical and Clerical Keys are only moderately successful. The Special Mechanical Key has validities of .35, .20 and .04, respectively for AFSCs 42, 43, and 47, whereas the Special Clerical Key has validities of .04,

-.06, and .02 respectively for the same groups. The Special Clerical Key has validities of .37, .22, and .07, respectively, for AFSC's 70, 64, and 29, compared with corresponding validities of .19,.19, and .07 for the Special Mechanical Key.

Among the homogeneous keys, the DuBois Education Key has fairly good positive validity across all samples while the Berkeley Broken Home Key has negative validity. Somewhat smaller but fairly consistent validities are shown for the Berkeley Education Key in the positive direction and for the Berkeley Itinerant Key in the negative direction.

The DuBois Mechanical Key tends to be slightly negative, the DuBois Clerical Key slightly positive. The AC-2A Mechanical Key also tends to have negative validity, while the Electronic and Administrative Keys have, in general, low positive validity.

The comparable validities for cross validation samples for criterion A are shown in Table 3. The validities for this criterion are not as high nor as consistent as those for criterion B, and present no additional useful information.

The Air Force has not used biographical inventories, personality, or interest tests in the manner of the Strong Vocational Interest Blank (Layton, 1960). That is, it has not used measures which differentiated successful men in different occupational groups from men in general unless the measures were also valid for differentiating the successful from the unsuccessful. There are, however, some interesting differences between upper criterion or successful groups in different AFSCs. The means of the successful groups are shown in Table 4.

The Table shows that the mechanical samples, 42, 43, 47, have high scores on DuBois Mechanical Key and Handyman Key; the electronic sample 30 is high on the Radio Key; the clerical samples, 29, 64, 70, are high on the Clerical Key. The clerical samples tend to have higher scores than the mechanical samples on the DuBois Extraversion Key and on the Berkeley Reading and Cultural Keys. The electronic sample is high on both Education Keys. There are also some sizable differences between AFSCs within the same career field, e.g., between 64 and 70 and between 43 and 47, which may explain why it is hard to devise differential keys that fit all AFSCs in a career field.

(cont fr p 1)

CONCLUSIONS

Of the (3) keys which were generally positively valid for predicting successful completion of Air Force tour, all contained the one most valid item: number of years of education completed. This was true of the General Key developed in this study and of the Education keys developed by DuBois and Berkeley. Keys with consistent negative validity were Berkeley's Broken Home and Itinerant.

Special keys developed for specific career fields held up well on cross validation for certain AFSCs in the field but not for others.

Keys whose validity depends mostly upon the inclusion of an education item would not be expected to contribute a great deal to aptitude tests in the prediction of success. The contribution of Broken Home and Itinerant Keys will depend upon their relation to education and aptitude.

REFERENCES

DuBois, P. H., Loevinger, Jane, and Gleser, Goldine C. The construction of homogeneous keys for a biographical inventory. May 1952. (Research Bulletin 52-18) (503-001-0011 ; AF 33 (038)-10588, Washington University)

Layton, Wilbur L. (ed.) The Strong Vocational Interest Blank. Minnesota Studies in Student Personnel Work No. 10, Minneapolis: University of Minnesota Press, 1960.

Distribution: 6570 PRL
AFSC (SCGB)
ATC (ATFTM)

ATTACHMENT: Statistical Tables

Table 1: DISTRIBUTION BY AFSC OF CASES IN CRITERION DICHOTOMIES

	Criterion A			Criterion B		
AFSC	Upper	Lower	Unknown	Upper	Lower	Total
00	1	659	1	3	658	661
20	103	211	14	293	35	328
22	106	174	10	247	43	290
23	4	101	3	80	28	108
25	64	299	11	320	54	374
27	370	1218	76	1290	374	1664
29	303	1388	99	1278	512	1790
30	639	1532	64	1902	333	2235
31	30	61	6	81	16	97
32	213	928	43	961	223	1184
33	19	21	4	41	3	44
34	34	62	1	85	12	97
36	59	276	23	248	110	358
40	35	91	2	111	17	128
42	201	1078	49	941	387	1328
43	659	2526	163	2404	944	3348
45	3	7	1	11	0	11
46	142	716	47	618	287	905
47	21	768	60	446	403	849
53	26	319	24	226	143	369
55	16	262	13	86	205	291
56	101	661	50	466	346	812
57	2	328	21	176	175	351
58	15	126	13	95	59	154
59	0	6	0	1	5	6
60	53	51[illegible]	31	290	306	596
62	30	816	68	393	521	914
64	189	1768	122	1194	885	2079
65	7	2	0	8	1	9
67	72	174	9	220	35	255
68	54	116	10	153	27	180
70	203	746	46	596	399	995
71	7	32	1	22	18	40
72	5	22	1	12	16	28
73	156	420	20	502	94	596
74	11	121	10	60	82	142
75	3	16	0	17	2	19
76	25	38	1	56	8	64
77	20	1038	47	650	455	1105
90	141	302	27	352	118	470
92	11	70	6	66	21	87
98	9	32	2	34	9	43
99	28	264	19	126	185	311
Total:	4190	20307	1218	17161	8554	25715

Table 2: Validities (r_{bis}) of Keys in Cross Validation Samples,

Criterion B

		Samples									
		Random	27	29	30	42	43	47	62	64	70	77
	No. of	N=500	374	400	333	387	400	400	393	400	399	400
Y	Items	P=.67	.78	.71	.85	.71	.72	.53	.43	.57	.60	.59
General	24	.380	.299	.310	.390	.421	.380	.432	.309	.471	.330	.413
Mechani-cal	11		.209	.070	.174	.347	.202	.039	.116	.191	.189	.246
Clerical	15		.140	.066	.162	.040	-.060	.016	.090	.222	.371	.103
uBois												
Mechani-cal	11	-.076	-.072	.029	-.159	-.156	.029	.117	-.042	-.133	-.025	-.056
Radio	13	.085	.077	-.044	.002	.052	.091	-.126	-.022	-.017	.014	-.060
Clerical	8	.147	.159	-.055	.070	.195	.129	.073	.049	.157	.224	.146
Security-Routine	7	.008	-.069	.005	.094	.162	.005	-.077	.007	-.010	.006	-.004
Education	7	.166	.212	.165	.267	.329	.277	.194	.228	.197	.226	.314
Extra-version	12	.016	.067	-.030	.012	.061	-.004	.009	.029	.066	.163	.004
Handyman	12	.022	-.039	.114	-.041	-.007	.053	.070	.109	.066	.007	.040
Super-visory	1	-.078	.048	.012	.009	.038	-.030	-.109	.114	.056	-.020	.012
Response-Set	9	.011	.067	.010	-.006	-.017	-.099	-.011	.096	.021	.120	.082

(Table continues on next page)

Table 2 (Continued)

Criterion B

y	No. of Items	Random N=500 P=.67	27 374 .78	29 400 .71	30 333 .85	42 387 .71	43 400 .72	47 400 .53	62 393 .43	64 400 .57	70 399 .60	77 400 .59
						Samples						
erkeley												
Education	7	.076	.085	.070	.182	.253	.096	.078	.169	.175	.249	.269
Urban-Rural	8	-.006	-.076	-.003	-.081	-.176	.012	-.086	.066	-.028	.021	.030
Itinerant	4	-.185	-.122	-.050	.009	-.136	-.160	-.169	-.002	-.131	-.085	-.124
Extra-version	6	.017	.033	.076	.047	.036	.057	.020	.170	.084	.101	.054
Reading	3	.052	-.060	-.127	.024	-.167	-.051	-.023	.032	.017	.011	-.089
Light Leisure	4	-.043	-.040	-.016	-.041	.016	-.049	-.079	.082	-.074	-.013	.016
Cultural	8	-.026	-.037	-.120	-.056	.037	.002	-.015	-.043	-.036	.138	-.082
Economic	11	.109	-.000	.074	-.011	-.021	.084	.095	.062	.060	.229	.069
Late Child	4	-.034	.074	.082	.045	-.041	-.110	.076	.032	-.101	.003	.006
Literary	8	.060	.062	-.036	-.043	.051	-.030	.011	-.023	-.071	.034	-.149
Large Family	7	.006	.045	.107	.031	-.045	-.137	-.012	-.026	.089	-.104	-.018
Foreign Born	3	.012	-.123	.029	-.065	.037	-.031	.145	-.000	.111	.080	.121
Broken Home	5	-.221	-.171	-.166	-.222	-.307	-.122	-.206	-.147	-.201	-.163	-.244
C-2A												
Mechanical	28	-.011	-.066	.067	-.157	-.100	.007	.140	.028	-.033	-.019	-.003
Administrative	27	.124	.130	-.005	.076	.134	.005	.015	-.019	.192	.175	.134
Electronic	22	.089	.195	-.015	.049	.068	.110	.013	.062	.052	.029	.016

Table 3. Validities (r_{bis}) of Keys in Cross Validation Samples, Criterion A

Key	No. of Items	Samples: Random N= 500 P= .17	27 370 .23	30 400 .29	43 400 .21
General	24	.230	.298	.087	.257
Mechanical	11		.174	.167	.120
Clerical	15		.128	-.005	.124
DuBois					
Mechanical	11	-.027	-.143	-.046	-.014
Radio	13	.034	.103	.094	-.043
Clerical	8	.086	.102	-.018	.000
Security Routine	7	-.108	.032	-.100	.017
Education	7	.207	.110	.177	.071
Extraversion	12	.010	.093	.030	-.081
Handyman	12	.083	-.078	.115	-.080
Supervisory	1	-.014	-.035	.096	.070
Response Set	9	.069	-.045	-.014	.000

(Table continued on next page)

Table 3 (continued)

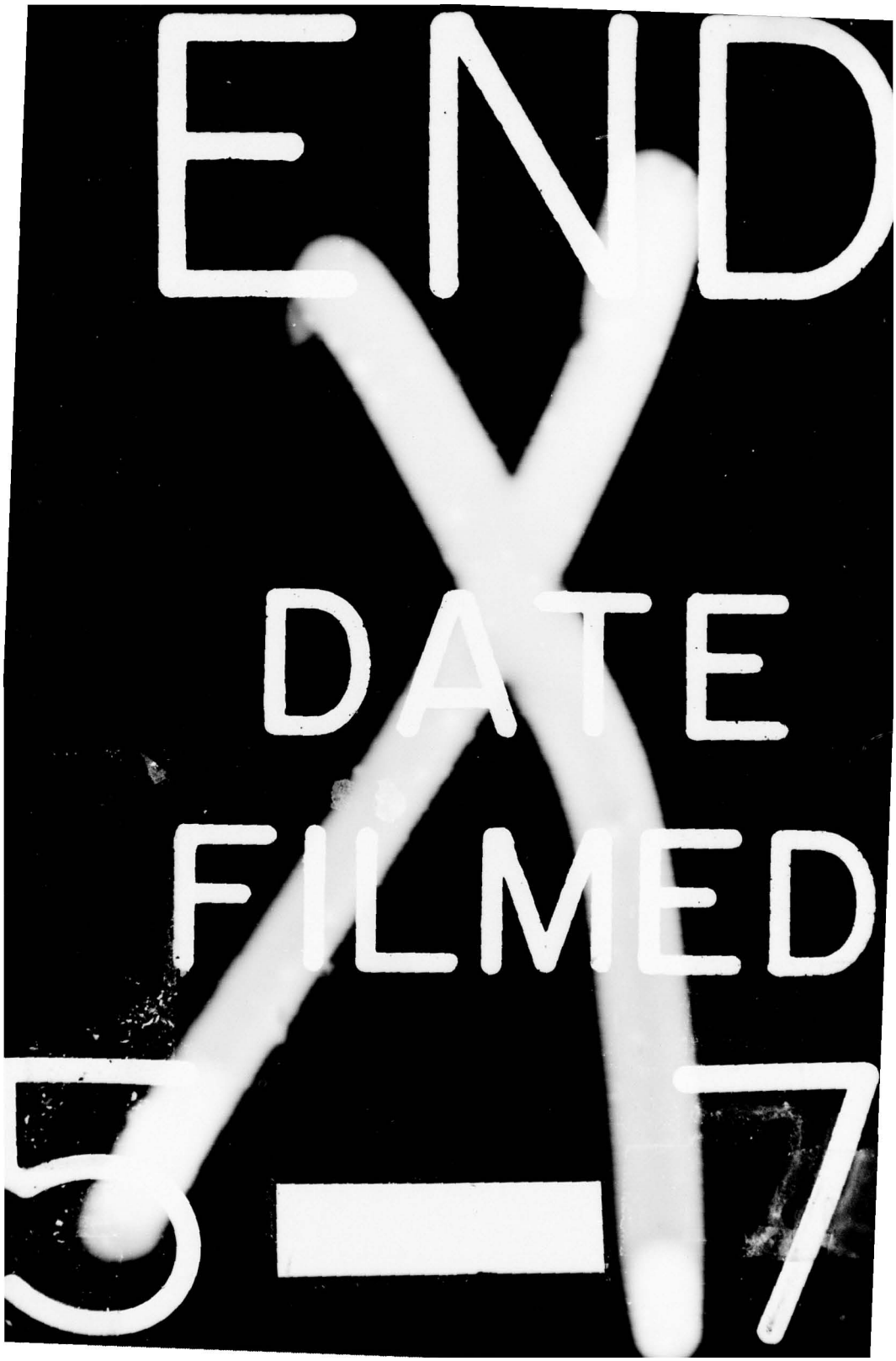
Criterion A

Key	No. of Items	Samples: Random N= 500 P= .17	27 370 .23	30 400 .29	43 400 .21
Berkeley					
Education	7	.170	.110	.175	.097
Urban-Rural	8	.038	-.088	.000	-.108
Itinerant	4	-.146	.005	-.107	-.088
Extraversion	6	.114	.006	.124	.059
Reading	3	.001	-.038	-.019	-.040
Light Leisure	4	-.122	-.059	-.068	.052
Cultural	8	-.011	-.054	-.004	-.102
Economic	11	.044	-.011	.083	.082
Late Child	4	-.083	-.048	-.040	.174
Literary	8	.075	.068	.106	.013
Large Family	7	-.113	.012	-.036	.079
Foreign Born	3	.109	-.018	.000	.035
Broken Home	5	-.092	-.094	-.069	-.133
AC-2A					
Mechanical	28	.011	-.083	.057	-.018
Administrative	27	.045	.125	.004	-.004
Electronic	22	.100	.085	.123	-.046

Table 4. Means Scores of Successful Groups Cross Validation Sample

Key	AFSC										Random Sample	
DuBois	27	29	30	42	43	47	62	64	70	77	M_{IL}	SD_T
Mechanical	5.0	4.4*	4.8*	6.4*	7.4*	7.8*	5.5	4.5*	4.6*	5.1	5.5	2.9
Radio	4.0	3.4	5.2*	3.7	3.8	2.7*	3.6	3.5	3.6	3.6	3.8	3.1
Clerical	2.2	2.6*	1.9	1.6	1.4*	1.3*	1.6	2.7*	3.1*	2.0	1.9	1.7
Security-Routine	3.1*	3.6	3.2	4.0*	3.5	3.8	4.0*	3.9	3.7	3.8	3.5	1.7
Education	2.7*	2.4	3.2*	1.8	1.9	1.5*	1.7*	2.1	2.5	2.1	2.1	1.6
Extra-version	5.7	6.0*	5.6	5.0	4.6	4.7	4.7	5.6	6.4*	5.4	5.1	2.7
Handyman	5.8	5.4	6.0	6.2*	6.8*	6.0	5.0*	4.8*	5.1	5.2	5.6	2.5
Supervisory	0.5	0.5	0.5	0.4	0.4	0.3	0.5	0.5	0.5	0.5	0.4	0.5
Response-set	6.0	5.9	6.1	5.8	5.6	5.6	5.8	5.7	6.0	5.9	5.7	1.7
Berkeley												
Education	2.2*	2.0	2.4*	1.5	1.3	1.1*	1.3	1.7	2.2*	1.6	1.6	1.4
Urban-Rural	5.4	5.3	5.4	4.6	5.0	4.4*	4.7	4.7	5.0	4.5	5.0	2.1
Itinerant	1.3	1.3	1.4	1.4	1.3	1.2	1.4	1.2	1.3	1.3	1.2	1.2
Extra-version	3.7*	3.8*	3.5	3.2	3.2	2.9	3.2	3.4	3.5	3.4	3.2	1.7
Reading	1.4	1.4	1.5	1.2	1.3	1.3	1.2	1.4	1.6	1.4	1.4	0.9
Light Leisure	2.7	2.8	2.7	2.7	2.6	2.6	2.9	2.7	2.7	2.8	2.7	0.9
Cultural	2.3	2.4	2.2	2.0	1.8	1.8	1.7	2.1	2.7*	2.0	2.0	1.8
Economic	4.2	4.0	4.2	3.5	3.7	3.2	2.6*	3.1*	3.8	3.2*	3.8	2.5
Late Child	1.5	1.4	1.4	1.3	1.2	1.7	1.6	1.4	1.4	1.7	1.3	1.3
Literary	3.1	3.2	3.2	3.0	2.9	2.8	2.7*	3.0	3.4	2.8	3.2	2.0
Large Family	3.8	3.8	3.8	3.9	3.4	4.0	4.2*	4.0	3.5	4.0	3.8	1.6
Foreign Born	0.2	0.3	0.2	0.3	0.2	0.3	0.3	0.3	0.4	0.4*	0.2	0.6
Broken Home	1.0	1.0	0.9	0.8	0.9	1.0	1.2	1.2*	1.1	1.1	0.9	1.0

*Significant at least at .01 level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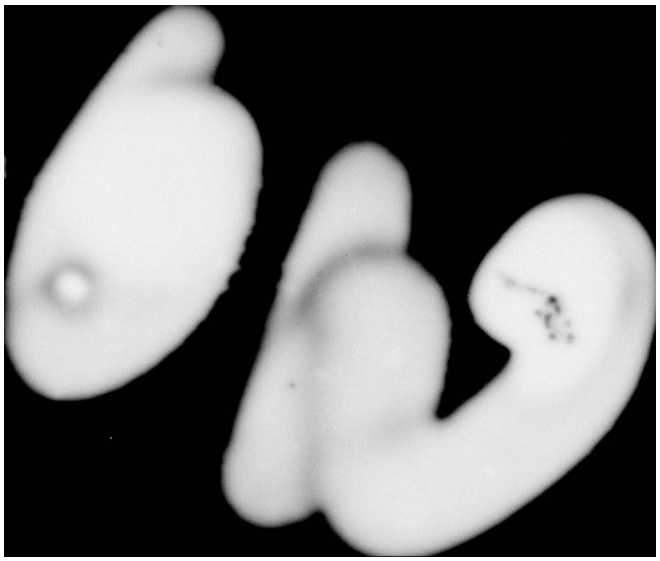

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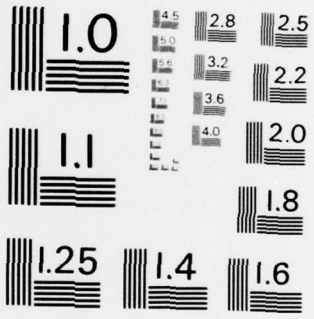

SUPPLEMENTARY

INFORMATION

Errata

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